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Claims

1. Station (U-RRP) for processing a first signal which can be generated by a mobile terminal and belongs to a plurality of signals for mobile radio communications networks, said station including:

- an input able to receive from an antenna (A) the first signal associated with a first band and at least one adjacent signal of said plurality associated with a second band adjacent to that of the first signal;
- a processing stage (BP-IF, DEM, AD-1) for generating from the first signal and from the at least one adjacent signal a first digital signal at a first sampling frequency, this first digital signal including a useful spectral content of the first signal and an interfering spectral content associated with said adjacent signal;
- a digital filter (DLPF) for processing the first digital signal, attenuating the interfering spectral content, and for providing a filtered digital signal including at least part of said useful spectral content;
- a converter (E/O-A) for generating from said filtered digital signal electromagnetic radiation to be transmitted on a waveguide (F-up1).

2. Station (U-RRP) station according to Claim 1, also comprising a sampling frequency reducer (SRR) connected to said digital filter for generating a second digital signal having a second sampling frequency lower than said first frequency.

3. Station (U-RRP) according to Claim 1, characterized in that the processing stage comprises an analog filter (BP-IF) having a passband such as to eliminate second signals of said plurality which are non-adjacent to the first signal and transmit a first electrical signal having said useful spectral content and said interfering spectral content.

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4. Station (U-RRP) according to Claim 3, characterized in that said analog filter (BP-IF) is a Chebyshev filter of 3<sup>rd</sup> to 7<sup>th</sup> order.

5. Station (U-RRP) according to Claim 3, also including a demodulator (DEM) connected to said analog filter (BF-IF) for demodulating the first electrical signal and generating at least one demodulated electrical signal associated with a third band and including at least portions of the useful spectral content of the first signal and the interfering spectral content of the adjacent signal.

6. Station (U-RRP) according to Claim 3, characterized in that said processing stage also comprises an analog-digital converter (A/D-1) for converting an additional electrical signal correlated to the first electrical signal into said first digital signal.

7. Station (U-RRP) according to Claim 4, characterized in that said first sampling frequency is greater than or equal to double said passband of the analog filter (BP-IF).

8. Station (U-RRP) according to Claim 5, characterized in that said first sampling frequency is greater than or equal to double said third band of the demodulated electrical signal.

9. Station (U-RRP) according to Claim 1, characterized in that said digital filter is an FIR filter with a number of taps such as to allow attenuation of the interfering spectral content.

10. Station (U-RRP) according to Claim 2, characterized in that the sampling frequency reducer (SRR) includes:

- an anti-aliasing digital filter for filtering said filtered digital signal and having a cut-off frequency substantially equal to half of said second sampling frequency;

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- a decimator for sampling a digital signal output from the anti-aliasing digital filter at said second sampling frequency.

5 11. Method for processing a first signal which can be generated by a mobile terminal and belongs to a plurality of signals for mobile radio communications networks, said method comprising the steps of:

10 - receiving the first signal and second signals of said plurality including at least one signal adjacent to the first signal and interfering with the latter;

15 - performing analog filtering of a first electrical signal corresponding to said first signal and to said second signals in order to eliminate the signals of said plurality which are non-adjacent to the first signal and transmit a second electrical signal having a useful spectral content associated with the first signal and an interfering spectral content associated with the adjacent signal;

20 - converting from analog to digital the filtered first electrical signal so as to generate a digital signal, said conversion occurring at a first sampling frequency and defining a first transmission rate of said first digital signal;

25 - performing digital filtering of the first digital signal in order to eliminate substantially the interfering spectral content and provide a first filtered digital signal including said useful spectral content;

30 - reducing the sampling frequency of said first filtered digital signal so as to obtain a second filtered digital signal to be sent on a first output bus and having a second transmission rate less than the first transmission rate.

35 12. Processing method according to Claim 11, including the steps of:

- converting an electrical signal correlated to said first filtered digital signal into electromagnetic radiation;

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- transmitting said electromagnetic radiation on a waveguide.

13. Method according to Claim 11, also comprising a step of multiplexing on a second output bus the second filtered digital signal with additional digital signals associated with additional signals of said plurality which can be generated by additional mobile terminals.

14. Method according to Claim 12, also comprising the steps of:

- before said electrical to optical conversion step, performing a conversion, from parallel to serial, of the second filtered digital signal;

- processing the second serialized digital signal so as to generate a corresponding electrical signal in accordance with a transmission protocol relating to said optical waveguide.

15. Mobile radio communications network (1) including:

- a main control center (RNC) of the network for managing a plurality of signals;

- a station (BSPP1-BSPP<sub>N</sub> CU<sub>1</sub>-CU<sub>N</sub>) for processing said signals, controlled by said main control center, the processing station being provided with a port (OP1) for receiving/transmitting electromagnetic radiation;

- a waveguide (F-up1) having a first end connected to said output port;

- at least one antenna station (AU<sub>i</sub>,U-RRP) for processing a first signal which can be generated by a mobile terminal and belongs to the plurality of signals, said station being connected to a second end of the waveguide and including:

- an input able to receive from an antenna (A) the first signal associated with a first band and at least one adjacent signal of said plurality associated with a second band adjacent to that of the first signal;

- a processing stage (BP-IF,DEM,AD-1) for generating from the first signal and from at least one

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adjacent signal a first digital signal at a first sampling frequency, this first digital signal including a useful spectral content of the first signal and an interfering spectral content associated with said adjacent signal;

5       - a digital filter (DLPF) for processing the first digital signal, attenuating the interfering spectral content, and for providing a filtered digital signal including at least part of said useful spectral content;

10       - a converter (E/O-A) for generating from said filtered digital signal electromagnetic radiation to be transmitted to the processing station by means of the waveguide (F-up1).

15       16. Mobile radio communications network (1) according to Claim 15, also comprising a sampling frequency reducer (SRR) connected to said digital filter for generating a second digital signal having a sampling frequency lower than said first frequency.

20       17. Mobile radio communications network (1) according to Claim 15, characterized in that said processing station includes processing apparatus (TPR,RPR) for coding/decoding voice or data signals to be sent/received to/from said at least one antenna station.

25       18. Mobile radio communications network (1) according to Claim 17, characterized in that said processing station also includes a block (MAP-FRA-FORM) for processing signals supplied from said apparatus (TPR,RPR) so as to make them compliant with the modes of transportation on said waveguide.

30       19. Mobile radio communications network (1) according to Claim 15, characterized in that additional antenna stations provided with respective antennas are connected to said waveguide.

35       20. Mobile radio communications network (1) according to Claim 15, which is such as to operate

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using a system of the UMTS (Universal Mobile Telecommunication System) type.

21. Mobile radio communications network (1) according to Claim 15, characterized in that said waveguide is an optical fiber.

22. Mobile radio communications network (1) according to Claim 19, characterized in that said waveguide forms a point-to-point link.

23. Mobile radio communications network (1) according to Claim 19, characterized in that said waveguide forms a ring connection between the said antenna stations. -

24. Mobile radio communications network (1) according to Claim 17, characterized in that an SDH (Synchronous Digital Hierarchy) standard is used for transportation on said waveguide.